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WATER POLLUTION CONTROL 1970-1974. THE FEDERAL COSTS

Federal Water Pollution Control Administration
Washington, D. C.

January 1969

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WATER POLLUTION CONTROL
1970-1974
THE FEDERAL COSTS

A Report to the Congress By
the Federal Water Pollution Control Administration
Pursuant to Section 16(a) of the
Federal Water Pollution Control Act of 1966,
(Public Law 84-660), as amended

Fiscal Years 1970-1974

U. S. DEPARTMENT OF THE INTERIOR
Federal Water Pollution Control Administration
Washington, D.C.

January 1969

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

January 17, 1969

Dear Mr. President:

This transmits the second annual report to the Congress of the Federal costs of water pollution control prepared by the Federal Water Pollution Control Administration.

Section 16(a) of the Federal Water Pollution Control Act of 1966, as amended, directs the Secretary of the Interior to furnish the Congress information necessary for authorization of appropriations to carry out the Act. This report is a detailed estimate of the administrative, grant and capital costs involved in achieving the objectives of the Act during the period Fiscal Years 1970-1974. The first report submitted in January 1968 covered Fiscal Years 1969-1973.

In preparing these cost estimates, we have had as our central purpose presentation of information that will assist the Congress in determining authorization levels for future appropriations. I believe we have made progress in defining and projecting program objectives, proposed accomplishments and costs since submission of the first report to the Congress. We will continue our efforts to improve the basis of the estimates and to relate cost projections to the mandates of the Act.

Sincerely yours,

Secretary of the Interior

Hon. Hubert H. Humphrey
President of the Senate
Washington, D. C. 20510

Enclosure

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Sincerely yours,

Secretary of the Interior

Hon. John W. McCormack
Speaker of the House of
Representatives
Washington, D. C. 20515

Enclosure

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TABLE OF CONTENTS

	Page
Letter of Transmittal	iii&v
Introduction	1
Part I	
Summary	3
Part II	
Program Structure, Accomplishments and Costs:	
Comprehensive Programs for Water Pollution Control	7
Grants to Non-Federal Water Pollution Control Planning Agencies	9
Uniform State Laws & Interstate Cooperation	10
Research,Development & Demonstration Program	11
Manpower Development and Training	15
Technical Investigations & Assistance	20
Pollution Surveillance	22
Field Laboratory and Research Facilities	24
Great Lakes–Research and Technical Development	25
Estuarine Pollution	25
Grants for State and Interstate Water Pollution Control Programs	27
Grants for Construction of Treatment Works	29
Water Pollution Control Advisory Board	31
Water Quality Standards Coordination	31
Enforcement	32
Cooperation to Control Pollution from Federal Activities	33
Administration	35
Cost Studies	36

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INTRODUCTION

The purpose of this report is to furnish the Congress with the information required by Section 16(a) of the Federal Water Pollution Control Act of 1966, as amended. In particular, this report is responsive to that portion of Section 16(a) which requests the Secretary to provide the Congress with the information necessary for authorization of appropriations. The Secretary is further requested to make a detailed estimate of the cost of carrying out the provisions of the Act for a five-year period. The report is to be updated annually. This is the second such report submitted to the Congress.

Most of the water pollution control effort thus far has been directed towards reducing the backlog of needed municipal sewage treatment works and preventing obvious industrial pollution. There are many other sources of pollution – some of which we still do not know how to control. Pollution is a very real threat to our physical and economic well-being and is present in every part of the country. Without proper control, it will be intensified by the expanding population and the paralleling increased industrial and food production. As demands upon our water resources rise, the available supply of clean water could dwindle dangerously in proportion unless we act now to prevent and abate pollution from all sources.

The Federal Water Pollution Control Act, as amended, does not specifically provide for abating all of the major sources of pollution. Certain controls for water pollution are delineated in legislation administered by other Federal Departments and Agencies and the Federal Water Pollution Control Administration cooperates with these other agencies and carries out interagency programs as required by law. While these relationships are described herein, this report does not include any costs for water pollution control which are borne by other Agencies acting under legislation other than the Federal Water Pollution Control Act or under Federal Executive Orders.

The "costs" of carrying out the Federal Water Pollution Control Act are considered as administrative costs of operating the Agency, grants costs (construction, research and development, state and interstate, training, and comprehensive basin planning), and capital costs of establishing and equipping field laboratories and research facilities (Table 1). Such costs are presented on a multi-year basis with the program accomplishments and long-range objectives described in the text.

It should be noted that FY 1970 costs shown in this report coincide with the FWPCA costs included in the President's Budget for FY 1970.

Of particular importance to the achievement of the objectives of the Act are the following FWPCA goals:

1. Developing the closest possible, most effective cooperation with the States, encouraging them to accept the primary responsibility for water pollution control;
2. Providing leadership in developing an adequate joint State-Federal water quality monitoring and surveillance system;
3. Finding solutions to special pollution problems such as industrial effluents, accidental spills of oil and toxic materials, and ascertaining the effects of thermal pollution;
4. Planning the location of municipal waste treatment works construction consistent with attaining and maintaining water quality standards and with implementing State water pollution control program plans;
5. Planning for the necessary manpower to meet the demand for skilled operators and technicians generated by the construction of municipal waste treatment facilities to attain water quality standards;
6. Controlling pollution from Federal activities and facilities.

The optimal mix of program costs for accomplishing objectives of the Act will, in the long run, be dependent upon effective program balance among the objectives. In developing the cost estimates contained in this report there has been recognition that all elements of the program must be coordinated. This is particularly true, for example, in the case of construction grant awards and the level of manpower training. Whatever the level of construction grants, there must be a corresponding level of manpower training if the grant objectives are to be maximized. Similarly, an expanded enforcement program requires increased pollution surveillance and technical assistance. We are continously striving to bring the projected costs of the various program objectives into proper balance.

In preparing the present cost estimates, this report has had as its central purpose presentation of information that will assist the Congress in determining the authorization of future appropriations. These cost estimates are based on reasonable expectation of what can be accomplished under no artificial budgetary or manpower constraints, and under the supposition that programs adequate for achieving objectives of the Act will be attained by the end of the FY 1970-1974 period. The

costs for each year of the FY 1970-1974 period are phased to correlate with the total costs of achieving the objectives by the end of the period.

The report is divided into two parts: (1) Summary; and, (2) Program Structure, Accomplishments and Costs.

SUMMARY

Normally, the summary would aggregate the costs of the major activities into a total estimated cost of carrying out the Act for the period Fiscal Years 1970-1974. This has not been possible, however, because factors affecting the composition of construction grant costs still were not resolved at the time this report was submitted to the Congress. The factors are: First, a new and additional method of financing the construction of waste treatment works has been proposed to the 91st Congress by the Administration. Second, since the current authorization for construction grants in the Act expires in FY 1971, consideration of the extension of the authorization could result in the establishment of a new basis of Federal support and therefore a new cost structure. Third, the FWPCA's continuing study of the national costs of treating wastes indicates changing cost relationships are emerging which will have an influence on the costs reported to the Congress in "The Cost of Clean Water" report submitted to the Congress in January 1968.

The costs of all activities other than construction grants have been accumulated in the summary, Table 1. As issues affecting the construction grant costs are resolved, and costs are more precisely defined, additional information relating to this report will be submitted to the Congress.

Section 8 grants costs for construction of waste treatment works are expected to greatly exceed expenditures to carry out all other provisions of the Act during the 1970-1974 period. The President's Budget for FY 1970 for the FWPCA includes $214 million for municipal waste treatment works construction grants. This amount represents 70 percent of the total FWPCA budget.

The next major area of expenditure will occur in carrying out research, development and demonstrations authorized by Sections 5 and 6 of the Act. The President's Budget recommends $25.5 million in Fiscal Year 1970. In order to carry out the research, development and demonstrations objectives of Sections 5 and 6, a total $213.5 million will be needed by the FWPCA during FY 1970-1974. In the FY 1970 Budget these expenditures amount to about 8 percent of the total FWPCA budget. A prime research and development objective is to develop by 1975 feasible techniques for complete elimination of point-source wastes as well as develop and demonstrate technology for the renovation of waste waters for re-use. Nonpoint sources of pollution, e.g., runoff, acid mine drainage, etc., are less amenable to a predictable solution but nonetheless, it is expected that major steps in developing technology for controlling such pollution will be accomplished by 1975.

Next in the order of funding levels is Comprehensive Programs for Water Pollution Control carried out under Section 3 of the Act. In the FY 1970 Budget, $9.9 million is included for activities conducted under Section 3(a) (b) and (c). This is approximately 3 percent of the FY 1970 Budget. It is estimated that these activities will require $71.0 million during the FY 1970-1974 period. Water quality management planning is oriented to the development of action programs for river basins using current knowledge and technology to plan for future water requirements.

Training follows comprehensive planning in estimated level of expenditures required to carry out the Act. The President's Budget for FY 1970 allocates $5.8 million for training as authorized by Section 5(a) (4) and (5). This amount is approximately 2 percent of the FY 1970 budget. During the FY 1970-1974 period of this report considers training activities will require $59.0 million. The objective of the manpower development and training program is to assist in attracting new professionals, technicians, and operators and to help prepare them and existing personnel for more responsible positions. To meet these objectives, FWPCA is pursuing a number of approaches such as technical training, both in-house and through the grants mechanism and by means of inter-agency funding, and professional training through grants and research fellowships.

Grants for State and interstate Water Pollution Control Programs total 10.0 million in the FY 1970 budget. This same amount will be needed each year throughout the 1970-1974 period aggregating to $50 million. It represents 3 percent of the budget in 1970.

During the FY 1970-1974 period, Enforcement authorized under Section 10 is expected to require the expenditure of an estimated $24.0 million. However, this is not the total fiscal impact of the Enforcement effort. Enforcement is also directly supported by a portion of the funds estimated for Section 5(b) (c) and 10(c).

Technical Investigations and Assistance is authorized by Section 5(b) of the Act. The 1970 Budget contains $3.8 million for this activity and it is estimated that a total allocation of $43.8 million will be needed during FY 1970-1974. Technical Investigations and Assistance lends support to all the FWPCA activities, and provides water pollution control assistance on problems faced by States, municipalities and industries. The program is involved in technical evaluations concerning oil shale, feedlot drainage, underground atomic projects, maintenance and operation of sewage treatment facilities, thermal pollution, and others.

The individual sections of the report describe program objectives and expected accomplishments related to the costs summarized in Table 1.

TABLE 1

SUMMARY OF THE COST OF CARRYING OUT PROVISIONS OF THE FEDERAL WATER POLLUTION CONTROL ACT OF 1966

(in thousands of dollars)

Section	1970 1/	1971	1972	1973	1974	Total 1970-1974
1. Total	$305,972	2/	2/	2/	2/	2/
Construction Grants and Construction Grants Administration	217,050	2/	2/	2/	2/	2/
Other Costs	88,922	$181,907	$191,403	$191,108	$183,913	$837,253
3. Comprehensive Programs for Water Pollution Control :						
(a) Comprehensive pollution control basin studies	7,935	7,750	8,200	8,800	9,100	47,785
(b) Regulation of streamflow studies		1,400	1,500	1,500	1,600	
(c) Grants to non-federal water pollution control agencies	2,000	4,000	5,000	6,000	6,000	23,000
Grants administration	3/	275	275	275	275	1,100 4/
4. (a&b) Uniform State Laws and Interstate Cooperation	5/	165	165	165	165	660 4/
5. Conduct and Coordinate Research and Training:						
(a) Conduct and coordinate research: 6/						
1. Collect research material						
2. Grants to institutions and individuals for research, training & demonstration projects	25,494	47,000	51,000	48,000	42,000	213,494
3. Advice and assistance to consultants						
4. Grant research fellowships (training)	4,580	8,500	9,000	11,000	15,000	48,080
5. Manpower development & training	1,264	2,650	2,600	2,400	2,500	11,414
(b) Technical assistance to State & interstate agencies	3,750	7,500	9,500	11,000	12,000	43,750
(c) Collect and disseminate basin data on water quality	2,600	7,000	11,000	14,000	14,000	48,600
(d) Conduct research and demonstrations: 6/						
1. Municipal waste treatment and water re-use						
2. Identification & measurements of effects of pollution						
3. Augmented streamflows to control pollution						
(e) Field laboratories, establish, equip & maintain 7/	–	14,000	5,000	1,500	1,500	22,000
(f) Great Lakes – research & technical development 8/						
(g) Estuarine pollution	300 9/	–	–	–	–	300 9/

6. Grants for Research and Development:						
(a) To States and municipalities for:						
1. Controlling storm water discharges						
2. Demonstrate advanced waste treatment & water purification methods & joint treatment systems	20,000	58,000	64,000	62,000	55,000	259,000
(b) To individuals for prevention of industry pollution						
7. Grants for State & Interstate Water Pollution Control Programs	10,000	10,000	10,000	10,000	10,000	50,000
Grants administration	3/	530	530	530	530	2,120 4/
8. Grants for Construction of Treatment Works	214,000	2/	2/	2/	2/	2/
Grants administration	3,050	2/	2/	2/	2/	2/
9. Water Pollution Control Advisory Board 10/						
10. Enforcement and Water Quality Standards:						
(c) Maintenance of water quality standards	752	762	768	773	778	3,833
(d) Enforcement conferences						
(e) Remedial actions	3,700	5,075	5,075	5,075	5,075	24,000
(f) Public hearings						
11. Federal Inter-agency Cooperation to Control Pollution	900	1,250	1,400	1,400	1,400	6,350
12. Administration (Executive Direction and Support)	5,217	5,600	5,900	6,200	6,500	29,417
16. (a) Cost Studies	430	450	490	490	490	2,350

Note: Sections 1, 2, 13, 14 and 15 do not require authorizations. Sections 16(b), 17 and 18 have been carried out in previous fiscal years.

1/ Derived from the President's Budget.

2/ Total costs and cost of carrying out Section 8 are not shown for Fiscal Years 1971-1974 because of proposed legislation affecting Section 8.

3/ Grants administration costs for FY 1970 are included with Section 3 costs.

4/ Four year total FY 1971-1974.

5/ Included in Section 10(d), (e) and (f).

6/ Costs shown for Section 5(a) are the combined costs of carrying out Sections 5(a) and 5(d). A portion of these costs also assist in carrying out activities authorized by Subsections 5(b) (c) (e) and (f).

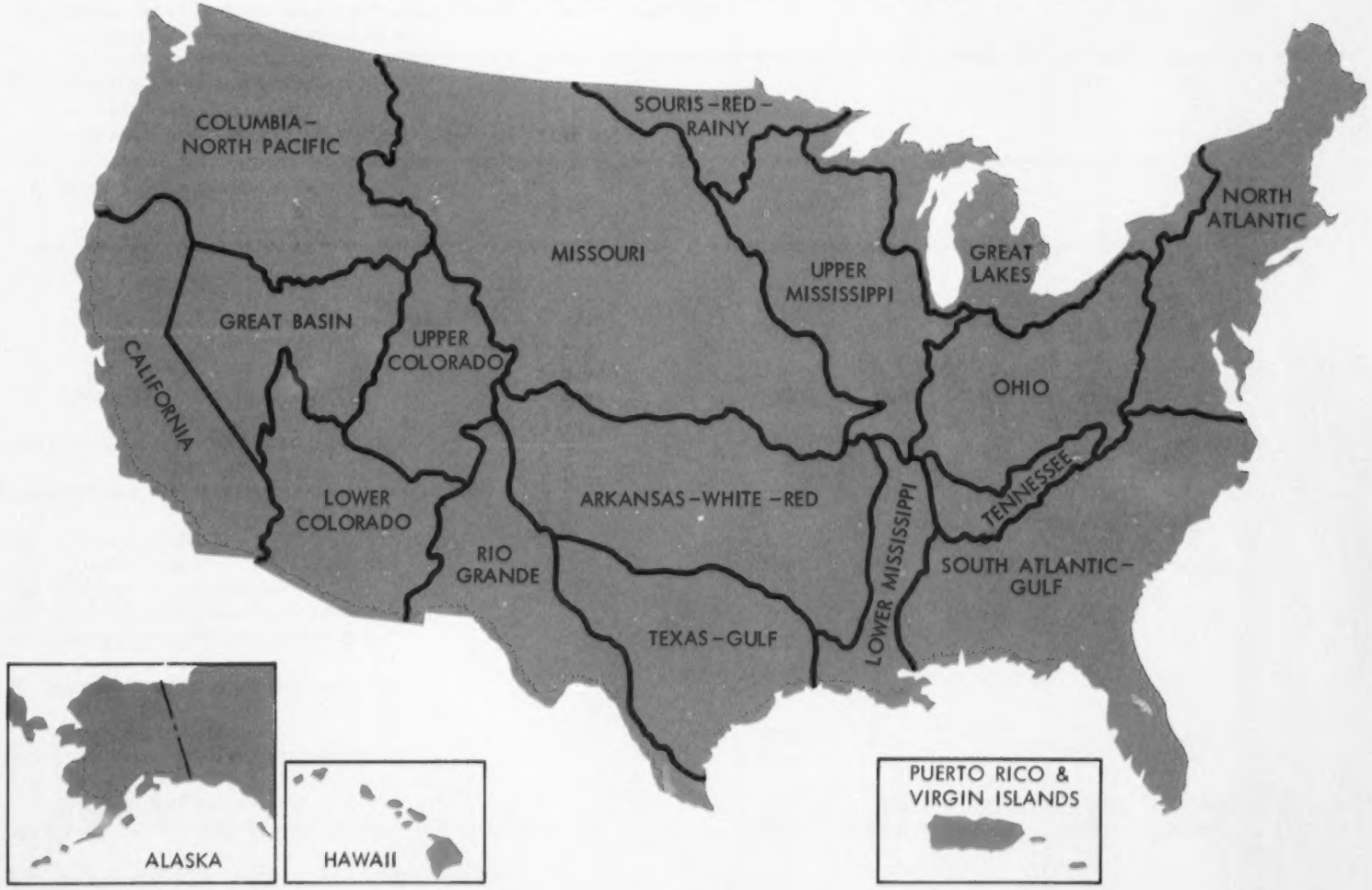
7/ Includes only planning, construction, equipment and repair and improvement costs.

8/ Included in Sections 3, 5(b), (c), (d) and 10(c).

9/ Includes 120 thousand for the National Estuarine Pollution Study to be completed in FY 1970. Remaining 180 thousand is for cost of activities related to the marine environment. FY 1971-1974 marine environment costs are included with Section 3.

10/ Included in Section 12.

WATER RESOURCES REGIONS
PROPOSED BY WATER RESOURCE COUNCIL FOR TYPE I COMPREHENSIVE SURVEYS



COMPREHENSIVE PROGRAMS FOR WATER POLLUTION CONTROL

Section	Cost estimates (thousands of dollars) Fiscal Years					
	1970	1971	1972	1973	1974	Total 1970-1974
3(a)	$ 7,935	$ 7,750	$ 8,200	$ 8,800	$ 9,100	$ 47,785
3(b)		1,400	1,500	1,500	1,600	

Section 3 of the Federal Water Pollution Control Act provides for the development of comprehensive water quality management programs; requires a determination of the need for and value of storage in proposed Federal reservoirs for regulating streamflow to control water quality; and authorizes Federal financial assistance to basin planning agencies.

Comprehensive River Basin Water Quality Planning

Water quality managment programs developed under this Section are designed to encompass all actions necessary to control water quality and manage the resource to satisfy all beneficial uses thereof. Such planning follows the total river basin concept and is essential to assure that today's large investments in pollution control yield optimum returns.

Water quality management planning is oriented to the development of action programs for river basins on the basis of current knowledge and technology and projected water needs and problems. Through the use of scientific, engineering and economic data developed in the basin studies, present problems are defined, future problems are anticipated, and a comprehensive approach is set forth for undertaking the immediate clean-up measures needed and for planning of long-range preventive measures. The programming includes an ongoing effort to perfect mathematical models to simulate water quality responses under various conditions, and to test the cost and effectiveness of alternative pollution control measures. The application of computerized programming and systems analysis techniques will result in the most effective planning.

Past basin studies have been a principal source of of information to some of the States in the establishment of water quality standards. The studies have also been useful in making possible the early correction of some major water quality problems, as well as providing a base for development of corrective programs for the more complex situations. Currently, the major thrust of comprehensive planning for water quality management is toward complementing the recently established quality standards and the State program plans for implementing these.

Much of the past planning activities has involved coastal waters such as the Delaware Estuary, San Francisco Bay, and Chesapeake Bay. Planning activities relating to marine and coastal waters are expected to intensify, reflecting the increasing need to protect resource values in those areas. As discussed in the chapter relating to Section 5(g) of the Federal Water Pollution Control Act, this will require increased information gathering and analyses in marine areas, and will call for additional funding in this program area.

Interagency Water Resources Planning

Many of FWPCA's comprehensive water quality management studies will be performed in association with the water basin planning activities now being coordinated by the Water Resources Council. These studies have provided the nucleus for FWPCA participation in the interagency planning activities. This will assure full consideration of pollution control as an integral part of the development and managment of water and related land resources on a long-range basis.

This inter-agency planning coordination includes completing framework plans (Type I) for the development of water and related land resources in all of the major river basins designated by the Water Resources Council by the end of the projected period. It also includes participation in Type 2 studies where located in basins selected by the Water Resources Council. It is estimated that this activity will be paced at a rate similar to that of FY 1969, calling for approximately $800,000 annually.

Interagency Review

As a part of the planning effort, the FWPCA

reviews all proposed Federal, Federally-assisted, and Federally-licensed water resource projects. Review activities presently extend to the Federal Power Commission licenses for hydropower development. The review of Federal projects is carried out under interagency procedures, the provisions of authorizing legislation, and Section 6 of Executive Order 11288.

The extension of review activities in these areas, plus the need to more carefully consider the impact of water resource and related development on the aquatic environment, will require increasing effort, staff, and budget support over the next five years. The FY 1969 costs, budgeted at $200,000, are expected to double by the end of the projected period.

Water Quality Control Through Storage for Streamflow Regulation

Section 3b of the Federal Water Pollution Control Act requires that storage for the control of water quality be considered in the planning of Federal reservoirs. The contribution that such storage can make to water quality and the advisability of including this factor in Federal projects is determined by the Federal construction agency involved with the advice of the Secretary of the Interior. Section 6 of Exective Order 11288 specifies that the effects of water resource project development on water quality shall be considered in the design of Federal reservoirs. When appropriate, specific storage for stream-flow regulation and/or project features needed for the control of water quality are recommended by the FWPCA and, if economically justified, included in the design.

Since Section 3b was added to the Act in 1961, FWPCA has made 297 reports to Federal construction agencies assessing the contribution that such storage could make to the quality of the Nation's surface waters. Provisions for storage for water quality control were recommended in 110 of these reports and have been included in 20 projects now completed or under construction. In all cases the benefits have been considered widespread since they are part of the national program to improve, preserve, and enhance water quality for a variety of public purposes.

Streamflow regulation can be a significant tool in water quality management. The law specifies that adequate treatment of municipal and industrial wastes must be provided as the basic first step in the control of pollution. Streamflow regulation is a "second line of defense" to be considered along with other possible means for preserving water quality for all legitimate uses, where even the best waste treatment or other controls of wastes at their sources are not or will not be sufficient to maintain desired stream quality.

As a result of the research carried out under other segments of the Federal Water Pollution Control Act, processes have been developed which broaden the alternatives available for water quality management. In considering the various alternatives for water quality management, improved techniques must be developed and applied to assure that water stored for flow regulation is managed effectively to serve water quality control purposes, together with existing patterns of water use. To assure that the new concepts in waste treatment, diversion, renovation, and wastewater re-use are considered and applied when appropriate, the Secretary of the Interior has proposed that greater attention be given to the evaluation of direct benefits accruing from water quality storage in multipurpose reservoirs. Recommendations in this respect are under review by the Water Resources Council. It is anticipated that the full and effective implementation of these recommendations will require more thorough and rigorous analyses of water resource development projects, thus increasing planning costs. This, of course, will result in a more adequate appraisal of water quality managment as an integral part of the total water resource development program.

The estimated costs of the Section 3b activities are separated out in the Table above, summarizing the full costs of administering Section 3.

GRANTS TO NON-FEDERAL WATER POLLUTION CONTROL PLANNING AGENCIES

Section	Cost estimates (thousands of dollars) Fiscal Years					
	1970	1971	1972	1973	1974	Total 1970-1974
3(c) Grants	$ 2,000	$ 4,000	$ 5,000	$ 6,000	$ 6,000	$ 23,000
Administration	1/	275	275	275	275	1,100 2/

1/ Grants administration costs for FY 1970 are included with Section 3 costs
2/ Four year total FY 1971-1974

This is a new program authorized by the Clean Water Restoration Act of 1966. These grants are designed to stimulate the kind of State-local planning so important to implementing and improving water quality standards and will lead to the formation of permanent arrangements for coordinated river basin water quality management.

As an illustration, joint or coordinated waste disposal systems serving municipalities, industries, and others offer substantial economies of size and provide opportunities for more effective and efficient pollution control through unified treatment and disposal. Shared costs should be less than for individual treatment. However, although the engineering technology is available, there are organizational and politcial problems which create institutional barriers. A first step is to get communities, industries, and regional economies to plan together. This provision of the Act offers great opportunities, over the long run, to stimulate this type of cooperation to achieve a greater measure of pollution control.

Section 3(c) authorizes grants to non-Federal agencies to support effective, comprehensive water quality control and pollution abatement planning for river basins. The grant may not exceed 50 percent of the planning agency's administrative expenses for not more than three years.

The planning grant program has progressed satisfactorily through its early stages of development. The first appropriation under the 1966 authorization was $500,000 for FY 1968, and was increased to $1,250,000 for FY 1969. To assist prospective grantees, FWPCA has prepared and distributed "Guidelines for Grants – Comprehensive River Basin Planning" to State, local, and interstate pollution control agencies. These assert that the basic purpose of a pollution control plan is to (1) serve as a guide for effective action to eliminate and control pollution throughout interstate or intrastate basins; and (2) provide permanent basinwide water quality management programs which involve joint efforts of State, local, and metropolitan bodies as well as private interests. An essential feature of a basin plan is the action program which identifies and evaluates alternative approaches to implementation including necessary fiscal arrangements and appropriate institutional frameworks through which States and local communities can coordinate their efforts to control pollution in the basin on a continuing basis.

Six water quality planning projects are currently receiving grant assistance for the preparation of basin-wide pollution control programs. Interest is widespread because of problems being encountered in meeting pollution control requirements in metropolitan areas, in meeting water quality standards, and in overcoming organizational hurdles to regional water quality management programs. Several States have initiated regional water resources planning programs and are providing leadership in incorporating water quality control needs in such programs.

The planning grants could prove to be a vital catalyst in stimulating State-local efforts to develop comprehensive basinwide pollution control programs. However, at this early stage the program's future dimensions are somewhat uncertain. Experience with this type of grant during the next few years should clarify future needs.

The estimated costs of the grants themselves for FY 1970-1974, set out above, are based upon current assumptions as to the likely response of State and local planning agencies. It is anticipated that effective participation in the program will grow steadily during this period. The costs for administering this grant program [previously incorporated under Section 3(a)] are set apart above. They consist largely of providing personnel to work with the prospective and existing grantee agencies, helping them initiate effective program plans. Certain grant processing costs are also involved.

UNIFORM STATE LAWS AND INTERSTATE COOPERATION

Section	Fiscal Years (thousands of dollars)					
	1970	1971	1972	1973	1974	Total 1971-1974
4 (a)(b)	1/	$ 165	$ 165	$ 165	$ 165	$ 660

1/ Included with Section 10(d), (e) & (f)

The functions defined by Section 4 are carried out primarily by the Division of Interstate Compacts and Uniform State Laws. In addition, the objectives of Section 4 are, in some part, carried out under Sections 3, 7, and 10. The cost estimates projected here cover only the specific activities of the Division of Interstate Compacts and Uniform State Laws. The costs are expected to be incurred during 1970-1974 in analyzing, digesting and reviewing existing State pollution laws; preparing and disseminating texts and information on model State acts and their specific provisions; reviewing proposed interstate compacts; and advising the Commissioner and the Secretary on these matters.

RESEARCH, DEVELOPMENT AND DEMONSTRATION PROGRAM

Section	Cost estimates (thousands of dollars)					
	1970	1971	1972	1973	1974	Total 1970-1974
Total	$ 45,494	$105,000	$115,000	$110,000	$ 97,000	$472,494
5 (a)(b)(c)(d)(f)	25,494	47,000	51,000	48,000	42,000	213,494
6 (a)(d)	20,000	58,000	64,000	62,000	55,000	259,000

Note: Subsections 5(a)(b)(c) and (f) costs included above are only those costs involved in the Research, Development and Demonstration Program. Other costs for these subsections are shown with appropriate programs and summarized in Table 1.

Solving the complex problems in pollution control demands a sound base of scientific and engineering knowledge and skilled manpower to apply that knowledge. A great deal of progress in water pollution control can, of course, be made with existing technology, but the need for new technology becomes strikingly evident when the amount and complexity of wastes produced by municipal, industrial, agricultural, and other users of water are assessed and evaluated. A prime research and development objective is to develop by 1975 feasible techniques for complete elmination of point-source wastes as well as to develop and demonstrate technology for the renovation of waste waters for re-use. Nonpoint sources of pollution, e.g., runoff, acid mine drainage, etc., are less amenable to a predictable solution but nonetheless, it is expected that major steps in developing technology for controlling such pollution will be accomplished by 1975.

FWPCA's research, development and demonstration program effort is divided into eight subprograms, five of which are oriented to specific sources of pollution and three of which develop information and technology to be applied to multi-source pollution problems. The specific source subprograms are:

Municipal-Pollution Control Technology;
Industrial-Pollution Control Technology;
Agricultural-Pollution Control Tecnology;
Mining-Pollution Control Technology;
Other-Sources-of-Pollution Control Technology;

and the multi-source subprograms are:

Water Quality Control Technology;
Waste Treatment and Ultimate Disposal Technology;
Water Quality Requirements Research.

In conducting work under these eight research subprograms, in-house effort will be carried out at seven authorized laboratory locations and at a variety of field sites across the country. These efforts will be supported by extramural projects funded under FWPCA's research, development, and demonstration grant and contract authorities under Sections 5 and 6 of the Act. The above table shows the costs of this program for Fiscal Years 1970-1974.

Briefly summarized, the activities under these subprograms may be categorized as follows:

1. *Municipal-Pollution Control Technology* involves the development and demonstration of technology for the effective and economical control of pollution from sewered wastes, storm and combined sewers, non-sewered waste, storm runoff, and joint (municipal-industrial) wastes. Strong emphasis will continue on developing and demonstrating new and improved methods for the treatment of sewered wastes. For non-sewered wastes, the objective is the development of improved treatment devices for individual homes, and isolated groups of homes or institutions, etc. Pilot-and full-scale demonstration projects to test the applicability of control or treatment methods, researched and developed in the area of combined sewer and storm sewer discharges, will be continued. These projects focus on large-scale evaluation and demonstration of control technology. The Section 6 authorization will expire with FY 1969, though complete solutions are not expected by that time. Hence, an extension of this authorization, or other funding, will be necessary. Special efforts are also being made to demonstrate the technology necessary to permit joint processing of industrial and

municipal wastes for greater economy and efficiency than independent handling of these wastes can achieve. Utilizing treatment, ultimate disposal and water quality control technology developed under other subprograms, pilot-and full-scale field evaluations and demonstrations will continue.

2. *Industrial-Pollution Control Technology* must be developed and demonstrated to achieve effective and economical control of pollution from such industries as those producing metal and metal products, chemicals and allied products, paper and allied products, petroleum and coal products, food and kindred products, textitles, etc. In FY 1967 studies were initiated to identify and analyze problem areas and to establish the existing state-of-the-art in treatment and control technology in selected industries. Based on these studies, specific problem areas are now being attacked. The competitive economic aspects of industrial waste control require examination of both conventional and completely new approaches to assure minimum cost solutions. Current waste treatment methods, while often adequate for today's conditions, offer little promise of providing the type and degree of treatment which will be required over the long run. An effective attack on industrial pollution will require a cooperative industry-government effort to conceive, develop, demonstrate, and install treatment processes, process modifications, water conservation programs, etc. Already research and demonstrations funded by Section 6 grants cover some industrial pollution problems from almost all major sources of industrial pollution.

3. *Agricultural-Pollution Control Technology* requires research, development and demonstration of technology to control and prevent pollution from sources related to agricultural activity. Major forms of pollution associated therewith are nutrients, pesticides, silt from runoff, salts and other pollutants in irrigation return flows, BOD runoff from animal feedlots, and silt and other solids from logging and forestry operations.

Many of these wastes are not "collectible" and, therefore, not capable of being given waste treatment in conventional fashion. New and imaginative solutions are being sought for these problems. Of particular concern at present are the nutrients and pesticides being flushed into our streams and lakes in agricultural runoff and the tremendous load of animal wastes discharged from a rapidly growing number of animal feed lots.

4. *Mining-Pollution Control Technology* concerns the areas of mine drainage, oil production, phosphate mining and other sources of mining pollution.

An estimated four million tons of acid from mine discharge into more than 4,000 miles of streams. Attempts to prevent or reduce such drainage have failed due to high costs of solving the problems for which there are no answers.

Problems related to oil production are of a different nature and solutions will be sought through laboratory and field work, including pilot and field scale demonstrations.

The commercial production of petroleum from the oil shale deposits in the Rocky Mountains is a potentially serious source of pollution. Substantial research and development will also be required to prevent saline and severe alkaline polllution in streams and aquifers, as well as siltation of streams, from becoming significant problems.

5. *Other-Sources-of-Pollution Control Technology* are also significant and require development and demonstration of technology for their effective and economical control. These sources include recreational boats and commerical vessels, construction projects, impoundments, saltwater intrusion, natural pollution, dredging and landfill operations, and the whole area referred to as "oil pollution."

Increasing amounts of wastes are discharged from the evergrowing number of recreational and commercial vessels which ply our waters, both inland and coastal. Suitable on-board equipment for properly treating vessel wastes before discharge is not fully developed. Generally, on-board sewage treatment units are bulky and heavy, or only minimally effective. Further research, development, testing and evaluation are urgently needed to deal more effectively with these problems.

Construction activities that affect the quality of water relate to housing developments, roads, railroads, power transmission lines, etc. The polluting substances likely to enter streams during and after construction include silt, chemicals, oil, gasoline, and sanitary wastes from construction camps.

Saltwater intrusion is a growing groundwater pollution problem in coastal areas. This is of particular significance in California, Maryland, New Jersey, Texas, and Long Island, New York. One solution now being researched involves recharging the aquifers with renovated waste water.

Water impounded in reservoirs can be used to alleviate pollution through flow augmentation. Unfortunately, the storage of water in reservoirs can adversely affect its quality. Thermal stratification can occur, leading to chemical stratification as well. New techniques are being researched to accomplish artificial destratification of impoundments to alleviate these problems. The complexity and extent of diffuse sources of pollution require a concentrated effort through both laboratory and field projects. Both short-term and long-term solutions for the important problems of pollution from dredging operations and oil pollution are urgently needed.

6. *Water Quality Control Technology* includes all research, development and demonstration directed toward the prevention and control of accelerated eutrophication, thermal pollution, the control of pollution by means other than waste treatment, the socio-economic, legal and institutional aspects of pollution, the assessment and control of pollution in extremely cold climates and the identification, source, and fate of pollutants in surface, ground and coastal waters.

The fertilization of waters (enrichment) has accelerated in recent years due to the nutrient loads imposed by increased quantities of municipal and industrial wastes and land runoff. The basic mechanisms involved in lake eutrophication are not well understood. Controlling it calls for study of the biology and chemistry of the aquatic environment, more complete analytical data on nitrogen and phosphorus compounds, and research on new and improved methods for nutrient removal in waste treatment, including pilot plant studies and field evaluations.

Development of water quality control technology will become of major and increasing importance as the pollution control payoff from waste treatment becomes increasingly marginal. Water quality control methods include the so-called at-source controls as well as such concepts as synthesis, diversion, dispersion, dilution, and environmental treatment. Exploration of new techniques in these categories began in FY 1968; the promising ones must be moved into pilot-scale and field studies in FY 1970 and 1971 as the exploratory work continues.

Mathematical models need to be evolved to relate pollution levels to the broad range of effects expressed in social and economic values. Research applicable to multiple sources of pollution must be expanded. This includes identification and characterization of pollutants, methodology for detecting and quantifying pollution sources, and determining the fate of pollutants as they move through the water environment, all essential to effective pollution control.

7. *Waste Treatment and Ultimate Disposal Technology* covers research, development and demonstration of treatment technology for pollution control and for the renovation of waste waters for re-use. Work in the laboratory has shown that it is technically possible to achieve any degree of waste treatment desired and, in fact, to return waste water to a quality at least as high as it was before use. However, considerable work remains to be done to achieve these degrees of treatment at any necessary location, under any conditions, and at minimum cost. Much of the over-all FWPCA research effort is directed toward the development of completely new and advanced waste treatment processes.

Because research findings have exceeded expectations, an accelerated program has been undertaken with increased assurance of both short- and long-term payoffs in both pollution control and augmented water supplies through water reuse. Practical payoffs have already occurred with the design and construction of a number of full-scale demonstrations of several of the processes. Under the level of support proposed, it is reasonable to expect that suitable processes for complete treatment of all waste streams and ultimate disposal of waste concentrates (both municipal and industrial) can be developed, field evaluated, and demonstrated by the mid-1970's.

8. *Water Quality Requirements Research* is needed on the effects of pollution to provide an improved scientific basis for determining the water quality necessary for municipal, industrial, agricultural, and recreational uses, and for the propagation of fish and other aquatic life. This information is essential to the establishment and refinement of the Nation's water quality standards. Because of the tremendous number of new chemical compounds being synthesized and finding their way into our environment each year, intensive research investigations must be conducted to develop a predictive capability allowing us to project the potential pollutional impact of these compounds in advance.

Far too little is known about the effects of pollution. The drastic effects, e.g., the massive fish kill, can be easily recognized, but quite often the true cause of such events cannot be defined even in extensive retrospect. To look ahead and to predict the occurrence of such events is, unfortunately, well beyond our current capability

for any but the simplest stream systems under the least complicated set of environmental conditions and pollution loads. There is also the challenge of detecting, understanding, and preventing the more subtle, long-term effects of pollution which could, even now, be robbing us of valuable water resources. Such effects, as yet unknown, may be just as real as the sudden fish kill, the unpalatable water supply, or the condemned bathing beach. Because these problems are difficult to solve and the starting baseline inadequate, a rapidly accelerated program is needed. Staffing of the recently completed National Water Quality Laboratory at Duluth, Minnesota, as well as increased staff at the National Marine Water Quality Laboratory, Narragansett, Rhode Island, and at several field sites including the fish toxicology activity at Newtown, Ohio, will contribute to this effort. This in-house effort must be supplemented with contracts and grants to obtain the service of highly specialized and often uniquely qualified investigators.

MANPOWER DEVELOPMENT AND TRAINING

Section	Cost estimate (thousands of dollars)					
5(a)	Fiscal Years 1970	1971	1972	1973	1974	Total 1970-1974
Total	$ 5,844	$ 11,150	$ 11,600	$ 13,400	$ 17,500	$ 59,494
Grants and Fellowships	4,580	8,500	9,000	11,000	15,000	48,080
Grants Administration	123	250	300	350	450	1,473
Technical Training	883	1,250	1,250	1,000	1,000	8,483
Manpower Development and Administration		850	750	750	750	
Management Development and Special Training	258	300	300	300	300	1,458

The success of the national water pollution control effort is closely linked to the availability of adequate numbers of trained personnel. Substantial expenditures for construction grants, research and development, technical assistance, and similar endeavors are proposed in various sections of this report. The effective utilization of these funds, and the nature and extent of the changes they are expected to create, depend heavily on adequate staffs of skilled and motivated people, from treatment plant operator to research scientist. The FWPCA report "Manpower and Training Needs in Water Pollution Control", (Senate Document No. 49, 90th Congress, 1st Session), documents the need to substantially increase the supply of skilled manpower to meet the unprecedented demands. FWPCA must act to increase the number and proficiency of those employed in water pollution control efforts at all levels of government, in the private sector, and in colleges and universities. Thus, manpower development has become a major program thrust within FWPCA.

Late in FY 1968; a Division of Manpower and Training was established within FWPCA, to bring together for the first time various related programs which had developed independently over the years without benefit of central direction. This new Division is developing an integrated approach to the many facets of the manpower problem. Existing programs are being carefully reviewed to test their relevancy and productivity. Existing needs data are being scrutinized and refined and alternative ways of meeting manpower needs are being explored. As the needs are more thoroughly understood and as supporting data are refined, significant changes can be expected in the mix of programs and levels of support. It is anticipated that the next five years will be a period of vastly accelerated effort and accomplishment, of shifts in program emphasis and of new dimensions.

The success of the FWPCA manpower and training program will be contingent, to a large extent, upon having an adequate data base and the analytical skills to interpret and put to use the data which are developed. Therefore, sufficient numbers of qualified staff must be added at headquarters and in the regions to develop and to implement programs. In some cases, in-house resources will have to be amplified by the use of consultants. To accomplish all this, the following work must be completed as rapidly as possible:

(a) Development of a manpower requirements data system. There is a need to design and maintain a system to provide, on a continuing basis, a means for identifying current needs and forecasting long range requirements for professional and non-professional manpower.

(b) An inventory and the development of a system for exchanging information on significant courses, curricula, techniques, and methods used for training in the water pollution control field. Such data would provide the means to avoid duplication of effort and expenditure and assist in

developing manpower and training programs in a more orderly fashion.

(c) An in-depth analysis of training methods.

(d) A job and task analysis of waste treatment plant operators, in various size plants, to provide the descriptive information necessary to develop appropriate levels and types of training.

(e) Identification and analysis of the impediments to the recruitment and retention of water pollution control manpower and the development of devices which may be appropriately used at the Federal level. Consideration will be given to the efficacy of career patterns for professionals, technicians, and operators, the use of apprenticeships, and mandatory certification of waste treatment plant operators.

(f) Analysis of the implications of automation with respect to manpower and training in water pollution control.

These are a few of the areas which must be examined and where information must be developed. Additional FWPCA staffing and funds for hiring consultants will be required to conduct such studies and analyses.

The objectives of manpower development and training programs are to assist in attracting and preparing new professionals, technicians, and operators and to help prepare existing personnel for more responsible positions. To meet these objectives, FWPCA is pursuing a number of approaches. These include: technical training, both in-house and through the grants device and by means of inter-agency funding, and professional training through grants and research fellowships. Each is discussed below.

Technical Training:

The FWPCA conducts, or sponsors, technical training programs with a specific purpose of providing a means to enhance the abilities of personnel from all agencies concerned with the control of water pollution. Special emphasis is given to training courses or programs which assist the State and local agencies in training their personnel, and which make these agencies full partners in the water pollution control effort.

The training of waste treatment plant operators has traditionally been viewed as a State responsibility. FWPCA recognizes that it has a responsibility to assist the States and also recognizes that it has a role to play in the training of waste treatment plant personnel at Federal installations. Therefore, FWPCA provides, through the use of its own training facilities and staff, selective offerings of practical courses in waste treatment plant operation, methods, and procedures – both to operators and to personnel engaged in operator training. This enables FWPCA to develop and test training techniques and materials which will ultimately be passed on to the states for large volume training of operators. In addition to these methods of assistance to the States, another approach to treatment plant operator training pursued by FWPCA is discussed in the section of this chapter concerned with Inter-Agency Resources for Technical Training.

Senate Document No. 49[1] points out the training needs generated for professional level employees. It notes that scientists, public administrators, and engineers, constituting the professional employment category, are employed in substantial numbers by Federal agencies, state agencies, municipalities and special districts, consulting engineers and educational institutions. Professional employees are also frequently engaged in overseeing the operation of waste treatment plants for large cities, sanitary districts, and industry. State administrators of the water pollution control agencies of the 50 states, estimate that their programs will need some 3,500 professionals by 1972. Based upon other data in this same document and upon available information on projected new treatment plant construction, it is estimated that approximately 6,000 waste treatment plant operators and 5,600 water quality technicians will need to be trained each year during the FY 1970-1974 period. FWPCA training efforts are being directed toward meeting these growing requirements in the following ways:

FWPCA In-House Training:

Specialized and advanced technical training is offered to personnel of FWPCA and other public agencies at all levels, located at the field laboratories, for new recruits to water pollution control as well as for experienced personnel in need of refresher courses or cross-training. Trainees are drawn from the professional, technicians, and operator ranks across the nation.

For the immediate future, the FWPCA in-house training program will concentrate on course offerings at the professional and technical levels, with limited, selective offerings at the operator level. The availability of funds, facilities, and instructor personnel dictates a training program that will reach those in the best position to transfer their gained knowledge to others in their sphere of influence. Also, the large number of individuals in the operator category, their geographical distribution, and the problems of time away from the job and the costs involved, among other factors, renders it unrealistic and infeasible for FWPCA to undertake mass training

1. Manpower and Training Needs in Water Pollution Control, 90th Congress, 1st Session, FWPCA report to the Congress.

at FWPCA facilities for the operator force.

The curriculum includes a variety of technical courses in water quality management of one or two weeks' duration. Also afforded are orientation courses and short technical seminars to meet the needs of particular Federal, State, and local agencies or academic institutions. In FY 1968, more than 50 of these short term courses were presented to approximately 1,320 persons at six FWPCA training facilities. For the next several years, as funds become available and agencies bring in additional personnel, the output of FWPCA training facilities will reflect related increases. By FY 1972, it is expected that agencies will experience a leveling off in new hires and that it will be several years before an additional expansion and the normal turnover of personnel will again increase the training base.

The FWPCA approach to in-house training is under constant analysis and evaluation with the specific objective of determining the relevancy of existing courses, the efficiency of methods of presentation and scheduling, and the requirement for new courses. This continuous surveillance will ensure the responsiveness of training offered by FWPCA to national and local requirements. Among the initial changes contemplated by FWPCA in FY 1970, is an offering of certain training materials as correspondence courses. These courses will be developed to serve several purposes. One planned use will be as a prerequisite to attending certain courses at FWPCA training facilities. This may permit the shortening of resident courses and result in the trainee spending fewer days away from his organization.

In addition, new courses will be developed to meet an emerging need for broader participation of non-technical persons who have administrative and decision-making roles in water pollution control, especially at the State and local level. Such courses are intended to improve the understanding of water pollution control issues and priorities and to broaden the perspective of attendees.

Also of significance in anticipating future training costs is the fact that, as additional laboratories are constructed, training will be made available to more people in these new laboratories.

FWPCA training personnel, in addition to preparing and presenting courses at FWPCA facilities, respond to requests for technical guidance from States, universities, and other institutions offering instruction related to water pollution control. The cost of this effort is also expected to grow during the next five years as the training programs of these various non-Federal entities gain momentum.

In summary, to maintain in-house training programs proportionate to identified manpower needs, FWPCA facilities should be training, through a combination of resident and correspondence courses, not less that 5,400 persons per year by FY 1974.

Grants and Fellowships:

Professional training grants are awarded to academic institutions to establish or extend the scope of advanced training in water pollution control in their engineering, biological, physical, and social science departments. Under this program, institutions are encouraged to develop the specialized and multi-disciplinary training of scientists, engineers, and administrators in water quality management. These grants support expansion and improvement of facilities and equipment, provide partial support of faculty salaries, and offer stipends, dependency allowances and tuition to trainees. As the programs develop, the proportion devoted to non-trainee support is drastically decreased, and the number of supported trainees per grant appreciably increased.

If the present preliminary indications are substantiated by further investigations, it is likely that the number of trainees supported by FWPCA will have to increase from 500 in FY 1969 to over 1,400 in FY 1974, to meet needs for professionally trained personnel.

Research fellowships are awarded to individuals for specialized graduate and postgraduate research training involving investigations particularly related to FWPCA's mission. These awards support the intensive training of fellows in engineering and the physical and biological sciences. They provide funds for institutional costs of education, stipends for the recipient, and allowances for supplies.

Since Research Fellows almost universally are pursuing studies for the doctoral degree or beyond, they are a critical factor in a substantial expansion of the training effort. Currently 75 percent of FWPCA-supported doctorate recipients embark on teaching/research careers. A year-old policy decision to place primary emphasis in professional training grant programs on the masters degree, in turn, makes research fellowships, supported by the FWPCA training program, the primary source of water pollution control oriented university faculty.

Traditionally, these devices have been used to support professional training and development. To a considerable degree, this is still true. However, we are exerting every effort to examine the professional and sub-professional manpower needs and to design means of most effectively meeting these needs. This may result in some changes in both the nature of training supported and in numbers supported.

Thus, although we use the cost projections developed last year as the basis for current projections, it is most likely that within another year the ongoing analysis of our grants programs and the analysis of our needs will indicate need for substantial

increases in funding. The number of new professionals required in the water pollution control field has been estimated at 5,000 per year for the next five years. In FY 1968, a total of 229 individuals supported by FWPCA training grants or research fellowships receeived degrees. Some continued their education so that less than 200 actually entered the field. A study of FY 1967 program support revealed approximately equal numbers of students supported by FWPCA training grants and fellowships, PHS environmental quality programs, OWRR water quality research grant assistantships, and FWPCA research grant assistantships. Therefore, we may assume that only about 800 professionals entered the field in FY 1968. Relatively few professionals are developed through other sources.

During the coming year a concerted effort will be made to refine manpower figures. Current information on a major element in supply of professionals will be forthcoming from a revision of the American Association of Professors in Sanitary Engineering/Environmental Engineering Inter-Society Board "Register of Graduate Programs in the Field of Sanitary Engineering." Preliminary investigations suggest that previous estimates of the number of professionals needed is high. Present indications are that 2,000 per year is a more likely figure than 5,000. Nevertheless, we fall far short of even that. Various techniques of recruitment to the field will be explored at several levels.

Grants for Technical Training:

The technical training grants program, inaugurated in FY 1968, is designed to increase sub-professional manpower resources – engineering aides and technologists, scientific technicians, and waste treatment plant operators – required for water pollution. Awards for funding teaching staff and for purchasing equipment are made to technical schools, junior colleges, and similar educational institutions for full-time specialized technical training in localities where needs, both present and future, are most evident. Furthermore, experimental grants are awarded to other institutions to develop and test new approaches to various technical training problems. Thirteen such technical training grants were awarded in FY 1968. These support pilot operations to demonstrate the value of various training techniques.

Budgetary limitations have inhibited planned development of this program in FY 1969 and FY 1970. Only those programs planned in FY 1968 for continuation beyond one year can be supported. However, a backlog of applications assures a rapid expansion when funds become available. A limited target of an average of one junior college technical training grant, without trainee stipends, per State is planned to help meet regional needs, and to serve as a model for additional institutional programs supported from other sources.

In addition, other types of programs must be explored. One, to attract undergraduate students into courses in water pollution, is under discussion. For example, a plan is being considered, subject to careful investigation of its practicality, for an average of one program per State which would provide trainee support initially to 10 students per program through forgivable loans or employment under When Actually Employed (WAE) or similar terms or a combination thereof to get commitment by college students on completion of their junior year to work in Federal or State agencies after graduation. This practice might be a relatively inexpensive device to obtain commitment to water pollution control careers, and to obtain career entry practitioners who could receive further on-the-job training. Work associated with training could help to solve local regional needs.

A wide variety of other educational programs, ranging from pre-college water pollution control experience to citizen education in environmental quality enhancement, offer unconventional opportunities for developing water pollution control effectiveness in a variety of areas – geographical and substantive. An experimental and exploratory program is under consideration to provide support for a variety of such educational efforts.

Inter-Agency Resources for Technical Training:

To meet the sizeable training needs identified in Senate Document No. 49, it is both practical and desirable for FWPCA to utilize the resources of other Federal agencies which administer manpower development and training programs, wherever the program objectives are compatible. As a first step, FWPCA became a participant in the Cooperative Area Manpower Planning System (CAMPS) during FY 1968. In addition, other inter-agency agreements are in process of negotiation and these are expected to grow appreciably in number and magniture during the next five years. Thus, as a matter of course, FWPCA's division of Manpower and Training has come to pursue external program resources wherever practicable. Beginning in FY 1968, FWPCA focused attention, through the CAMPS mechanism, on the need to train a large number of waste treatment plant operators and, for the first time, to foster the use of the Manpower Development and Training Act of 1962, to meet a substantial part of this need. It is anticipated that most State and interstate water pollution control agencies will develop at least one project funded by the Manpower Development and Training Act, through interaction with CAMPS, by the end of 1971, and sustain such projects through 1974 and beyond.

FWPCA is also exploring, with the Departments of Labor and Health, Education, and Welfare, their vocational education and manpower development programs (other than those funded under the Manpower Development and Training Act) which have potential for meeting training needs in the water pollution control field. Two or three other Federal agencies also have programs which may eventually be helpful. These are being explored and will be utilized wherever possible.

A current example of pooling the resources of various government agencies is the multipurpose demonstration project, primarily aimed at the removal of debris from major waterways, undertaken in early 1969 by FWPCA. The project, known as "Operation Clean Streams," was initiated in Washington, D.C., Cook County, Illinois, and in three Puerto Rican communities. FWPCA requested and received the assistance of the Department of Labor, Neighborhood Youth Corps, U.S. Corps of Engineers, the National Park Service, and several units of local government.

In addition to cleaning up debris along the waterways and thus helping to abate one source of pollution, the program was designed to alert the youths involved to career job opportunities in Federal and local governments, especially in water pollution control. Such projects as these can provide unskilled labor candidates for job placement in local programs – with the possibility of these youths being trained and proceeding up the career ladder in the waste treatment field. "Operation Clean Streams" was generally considered successful, and demonstrated the feasibility of an interagency approach to abating certain aspects of pollution and concomitantly accomplishing program objectives with other agencies. FWPCA expects to undertake a limited number of additional demonstration projects of this type during the next five years and will make available to interested agencies and groups, for widespread use, the techniques and methodology which are developed.

In preparing the first report to the Congress on, *Water Pollution Control – The Federal Costs*, submitted in January 1968, the potential for using interagency resources for manpower training, was not fully recognized nor was the investment required by FWPCA to develop these resources identified. On the basis of experience gained during the last twelve months, it is apparent that the manpower development and training programs of FWPCA can be greatly enhanced by adding staff to the Division of Manpower and Training to develop interagency and intergovernmental programs such as those described. These costs are, therefore, included in this year's projections. This approach offers numerous advantages to all interested parties. To FWPCA and other agencies in the Federal government it offers the opportunity to develop programs, which will significantly increase the amount of trained manpower, drawn to a large extent from the ranks of the unemployed, the underemployed, and the disadvantaged. To the State and local agencies in need of such manpower, it makes available existing Federal monies and is, therefore, of immediate and tangible benefit. To the extent that the resources of other Federal agencies can be utilized for the bulk training of sub-professionals, FWPCA funds for technical training can be used more extensively as a catalyst to foster innovative approaches.

TECHNICAL INVESTIGATIONS AND ASSISTANCE

Section	Fiscal Years (in thousands of dollars)					
	1970	1971	1972	1973	1974	Total 1970-1974
5 (a) & (b)	$ 3,750	$ 7,500	$ 9,500	$ 11,000	$ 12,000	$ 43,750

The Technical Investigations and Assistance program operates through the Regional Offices with special backup capabilities of manpower and equipment at Cincinnati. Technical support for all of the Administration's activities, such as the comprehensive and enforcement programs, and responses to requests for assistance for States, municipalities, and industries are provided by this program.

The program is also involved with keeping abreast of the technical developments and technical needs in new or emerging areas of water pollution control. These include such considerations as oil shale development, feed lot drainage and other agricultural pollution problems, underground atomic projects, thermal pollution, the impact of subsurface waste disposal on ground water resources, and others. This work is coordinated with FWPCA's research and development efforts in these areas.

Possibly the greatest number of requests for technical assistance come from the States which have inadequate staffs and budgets. FWPCA is looked to for help on water pollution problems that require studies beyond State capabilities. Many of the requests cannot now be met or the assistance asked for must be deferred under the present level of funding.

Technical assistance has been provided for a wide range of water pollution problems. A few recent examples of such assistance and current projects are:

1. As directed by the President in his memorandum of June 7, 1968, a National Multi-agency Oil and Hazardous Materials Pollution Contingency Plan has been developed and approved. Regional contingency plans are in various stages of development. The Department of the Interior is responsible for administering, developing, and revising the national plan and, through the Federal Water Pollution Control Administration, will provide technical expertise relative to water pollution control techniques. Means of controlling and minimizing the effects of accidental spills are under on-going study.
2. Initiation of a study, at the request of the State of Louisiana, to determine sources, effects on water uses technology and economics of control of organic substances in the Lower Mississippi River and its associated waters. Plans for this Lower Mississippi River Basin Technical Assistance Project call for a five-year study, with the FY 1969 activities primarily directed at taste and odor problems in municipal water supplies.
3. The Cross Florida Barge Canal Project is an ongoing pre-and post-impoundment water quality study requested by the U.S. Army Corps of Engineers in conjunction with a major navigation project. The terminal date for this study will be determined by the Corps' future activities and further requests.
4. A Jamaica Bay, New York, Study is evaluating the effect that disinfection of major domestic sewage discharges has on the bacteriological quality of the Bay waters. Two annual cycles in this important recreational area have been covered to date, and coverage of at least one more annual cycle is anticipated before the study terminates.
5. In the Great Lakes Region a technical study is evaluating the possible pollutional effect on ground water aquifers of tunnels proposed for the temporary holding of combined sewage in the Chicago area. The pollutional effect on the aquifers of industrial waste disposal by the deep well injection method is also under study.
6. A baseline study of the lower Missouri River is being made to develop data needed in connection with implementation of the water

quality standards program.

7. Work is continuing on the San Joaquin Tile Drainage Constituent Investigation having as its objectives (1) the development of a means for estimating nitrogen, phosphorus and pesticides concentrations in tile drainage; (2) characterization of soils in potential drainage problem areas; (3) estimation of agricultural practice for various crops to include fertilizer, pesticide, and water uses. This FWPCA investigation is part of a cooperative study involving certain other Federal agencies and related agencies of the State of California. Completion of the FWPCA study is now planned for the end of 1970 or early in FY 1971.

8. Work continues on the Columbia River Thermal Effects Study which has as its objectives (1) to provide information on the water temperature limitations and requirements of the economically important fishery resources of the Columbia River; (2) to develop a mathematical temperature model as a tool for evaluating the effects of heated wastewater discharges as well as for overall basin management. The mathematical model has been developed, and verified and used. The study, a cooperative one with other agencies of the Department of the Interior, will be completed in FY 1970 or early in 1971.

9. Approximately 300 requests for consultation have been honored in the past 12 months involving a wide range of specialized subjects. These include constituent analysis and treatment of industrial wastes, sewage treatment plant evaluations, radio-active pollutants in water, field laboratory methods, eutrophication, and acid mine biology. Requests for technical assistance are constantly increasing, with State requests comprising the largest single category. With the implementation and enforcement of water quality standards, the mounting number of State requests for aid will inevitably continue. Responsibilities added by the adoption of the National Oil Contingency Plan further tax the available resources.

The costs projected at the beginning of this chapter are calculated to meet needs for technical investigations and assistance, through expansion of regional staffs and facilities, to enable FWPCA to capably provide the technical support called for.

The technology of extracting, transporting, and refining oil for its many uses has outpaced the laws enacted to control that technology and prevent oil pollution in man's environment.

New legislation is under consideration to close this serious gap. Further closure of the gap in interanational controls of oil pollution is also needed.

Pending development of more effective oil pollution legislation, FWPCA has developed a program within the existing authorities of the Federal Water Pollution Control Act and the Oil Pollution Act of 1924.

The United States Goverment has mobilized all its existing authority to cope with spills of oil and other hazardous substances. FWPCA has spearheaded development of a set of inter-agency contingency plans, tailored to various parts of our Nation, involving all available talent and equipment under existing laws. The President ordered devised the most effective system possible to discover and report pollution incidents, stop and spread of oil, clean up and dispose of the pollutants, and institute available legal action to recover cleanup costs and enforce other related Federal statutes. The plan will operate in our inland and coastal waters, the contiguous zone, and the high seas beyond this zone where there exists a threat to United States waters, shores or the Continental Shelf.

A portion of the costs projected for Technical Investigations and Assistance is for the purpose of execution of the National Oil Contingency Plan when the spills occur.

POLLUTION SURVEILLANCE

Section	Fiscal Years (thousands of dollars)					
	1970	1971	1972	1973	1974	Total 1970-1974
5 (c)	$ 2,600	$ 7,000	$ 11,000	$ 14,000	$ 14,000	$ 48,600

The implementation and enforcement of water quality standards, the development of comprehensive water pollution control basin programs, the administration of grant support, and the preparation of annual reports to Congress on pollution control costs, to be effective, require up-to-date, accurate fact-finding and readily available data. The projection of costs to accomplish this is shown in the above table.

To maintain ongoing knowledge of the extent and nature of water pollution calls for several types of information. First, we need to know what waste treatment and control facilities – municipal, industrial, Federal, or other – now exist. We need to know how effective these facilities are. We need to know present and future water uses. We need to know current and potential pollution-caused problems. Overall, this depicts the situation as it now stands.

Next, we must know how this situation will change and vary. Are water quality standards being met? Can breaches of standards be traced to sources? How can new pollution situations be dealt with?

The objective of the FWPCA pollution surveillance program is to provide a mechanism whereby pollution control information and water quality data are collected, evaluated, and disseminated for use, particularly as related to the implemenation of water quality standards, the establishment of water quality baselines, and water quality planning and management programs. The collection of data is being done in full coordination with other Federal and State agencies in order that all available sources of technical information can be utilized at the national, regional, and basin levels.

A most important first step is establishing close cooperation with state water pollution control agencies. Coordinated water quality monitoring programs must be planned and operated cooperatively with State, local, and other Federal interests to assure adequate support of water quality standards surveillance and other FWPCA program needs, such as basin planning and technical studies. Continuous collection of reliable basin information on water quality, waste discharges, and treatment plants is essential to the effective conduct of a dynamic national pollution control program. This has always been a requirement, but the need is intensified with the establishment and implementation of water quality standards. FWPCA will have to be able to detect violations of standards and measure progress toward objectives.

Data collection over the years has given FWPCA a good start toward meeting these needs. Now the effort must be strengthened and intensified. We must increase our sources of data, ensure accuracy from all sources through analytical quality control, and expand our STORET (STOrage and RETrieval) System computer programs in order to cope with new data requirements. Our efforts will be directed toward:

1. Completion and maintenance of a current inventory of municipal waste treatment facilities, including specific scheduled construction needs as identified by water quality standards, the findings of enforcement conferences, and other sources;
2. Initiation of a national industrial waste water inventory;
3. Completion of a summary of industrial waste treatment construction needs as identified by water quality standards, findings of enforcement conferences, and other sources.
4. Completion and implementation of plans for fully coordinated State/Federal water quality surveillance systems to support water quality standards enforcement and revision, water quality baseline and trend evaluation, and planning and management programs. These plans will provide for the orderly growth of necessary monitoring to attain adequate national coverage by 1974.
5. Computer coding and storage of technical data on a continuing basis, including criteria and water use data presented in the water quality standards.

The outputs from FWPCA's pollution surveillance program provide, on a continuously current basis, accurate measures of progress (facilities being constructed on schedule, trends in water quality), as well as identification of situations requiring remedial action (adverse water quality trends, non-compliance with construction schedules or water quality goals).

At the same time, it must be recognized that, though this program provides, or will provide, a good insight into municipal and industrial pollution control, there are other pollution sources, such as thermal discharges, acid mine drainage and agricultural runoff, which have significantly deleterious effects on receiving waters. These, too, must eventually be identified to obtain a realistic picture of the pollution problem. The surveillance program must continue to grow, therefore, both in identifying waste discharge points and in monitoring the quality of receiving waters. We need to accelerate state and Federal monitoring activities, and we are working toward this through the coordinated design of water quality surveillance systems and through state program plans.

A coordinated program with the United States Geological Survey is being developed providing for the eventual transfer to that Agency of operating responsibility for most of FWPCA's long-term water quality monitoring requirements. In addition, FWPCA utilizes basic hydrologic information collected by the United States Geological Survey. Over the long run, we will have to find ways of encouraging or requiring effluent monitoring as well as stream monitoring, and this will call for new activities and attitudes on the part of cities, industries, and others.

Because the vast quantities of state and Federal data require continuous processing and evaluation, STORET is being upgraded. Initially, this computerized data processing system was developed to process water quality data from a variety of sources. Currently, the system is being expanded to process and evaluate other types of data, including waste treatment facilities information, water quality standards, and implementation of the latter. Thus, we will be able to continuously compare facilities in place versus construction schedules, and actual versus desired water quality conditions (i.e., progress by point, stream reach, basin and nationally). In addition, STORET capability will make possible the early identification of new types and sources of pollution and timely initiation of enforcement action.

Monitoring is basic to the water quality standards program. The monitoring network will be a cooperative State-Federal effort. However, the bulk of the responsibility for carrying out the required monitoring rests with the state pollution control agencies. Nevertheless, there must also be a residual Federal water quality monitoring effort to support Federal regulatory responsibilities under the Act. Basically, this will require sampling at major interstate waterway points, at the mouths of major tributaries, and in the vicinity of major population and industrial complexes. The cost estimates do not include costs for any effluent monitoring which is expected to be assumed by the state-local governments and by industries.

FIELD LABORATORY AND RESEARCH FACILITIES

Section	Cost estimates (thousands of dollars)					
	1970	1971	1972	1973	1974	Total 1970-1974
Total		$ 14,000	$ 5,000	$ 1,500	$ 1,500	$ 22,000
5 (e)						
Planning						
Construction		12,500				12,500
Equipment			4,000			4,000
Rep. & Imp.		1,500	1,000	1,500	1,500	5,500

Under the authority of Section 5(e), the FWPCA has established four regional laboratories. These laboratories are developing strong research and development capabilities, pollution control expertise, analytical services, and training programs.

Strong focal points of research, technical assistance, and analytical capability are required to attack and cope with regional and national pollution problems. Field laboratories and research facilities provide such focal points and are also excellent locations for training of workers in the best known methods and techniques in water pollution detection and control.

The regional laboratories, located at Ada, Oklahoma; Athens, Georgia; College, Alaska; and Corvallis, Oregon, are primarily oriented to the predominant pollution problems in their respective regions. At the same time, many of these regional findings will be applicable to similar situations throughout the country. For example, research and development directed toward the solution of problems associated with the pulp and paper industry is concentrated at the Corvallis Laboratory. The results here are obviously transferable to other regions. Similarly, solutions to problems associated with the pollution of groundwater are being developed at the Ada Laboratory and will have widespread application.

The National Water Quality Laboratory, located at Duluth, Minnesota, is concerned largely with researching water quality requirements for fresh water uses. The results of this research will ultimately provide a basis for refining and improving water quality standards everywhere.

The Cincinnati Water Research Laboratory, located at the Robert A. Taft Sanitary Engineering Center in Cincinnati, Ohio, was established prior to the Section 5(e) authority. It is involved in a wide variety of activities oriented toward both national and regional problems.

Because of the urgent need to get work under way on water quality requirements for all marine water uses, temporary facilities have been occupied at Narragansett, Rhode Island. This is the forerunner of the National Marine Water Quality Laboratory authorized for this location. Because of the national fiscal situation, construction has been deferred.

Six additional laboratories have been authorized to provide on-the-scene support for regional water pollution problems and programs in other parts of the Nation.

Funds to plan another regional facility are being programmed for FY 1970 from unused balances made available for other purposes in prior years. The operation and routine maintenance costs of these laboratories have been included in the program costs identified with other sections of the Act. The planning, construction, initial equipment, repair and improvement costs of the FWPCA laboratories are shown in the table at the beginning of this chapter.

GREAT LAKES – RESEARCH AND TECHNICAL DEVELOPMENT

Costs related to this subsection are dispersed throughout the FWPCA's programs, such as Comprehensive Planning, Technical Investigations and Assistance, Pollution Surveillance, Water Quality Standards Coordination, and Research, Development, and Demonstrations. Therefore, they are not separately identified here.

Section 5(f) recognizes the special importance of the Great Lakes in the Nation. This subsection directs the FWPCA to conduct research, studies, and technical development work with respect to the present and future water quality of the Great Lakes.

FWPCA is conducting studies of the special problems of water pollution in the Great Lakes and is working to develop short and long-range control plans. Two special studies completed during 1968 are the "Lake Erie Report" and "Water Pollution Problems and Improvement Needs, Lake Ontario and St. Lawrence River Basins."

The FWPCA's "Lake Erie Report," issued August 1968, recommended a plan of action, described what must be done to save Lake Erie, and how much it will cost. It pointed out that the cleanup of Lake Erie is less a problem of engineering than it is one of diverse, inadequate, and unwieldly changing governmental policies, funding, and management. The technical engineering methods of waste control are known or are close at hand, with the main requirement being only their coordinated application. The establishment of interstate water quality standards constitutes a focal point for cooperative efforts to save Lake Erie. If these standards are to be achieved it will call for much larger Federal expenditures for pollution control.

Another FWPCA report was issued in June 1968, titled "Water Pollution Problems and Improvement Needs, Lake Ontario and St. Lawrence River Basins" in cooperation with the New York State Department of Health. This report summarizes the water pollution problems of the United States waters of Lake Ontario and the St. Lawrence River and their tributaries. It also identifies the causes of these problems or sources of pollution, discusses the improvements needed, and presents a program of recommended actions.

Research, studies, and technical development work with respect to present and future water quality of the Great Lakes will continue to be given special attention by all of the FWPCA programs during the FY's 1970-1974 period.

ESTUARINE POLLUTION

Section	Cost estimates (thousands of dollars) Fiscal Years					
	1970	1971	1972	1973	1974	Total 1970-1974
5 (g)	$ 300 1/					$ 300 1/

1/ Includes 120 thousand for the National Estuarine Pollution Study to be completed in FY 1970. Remaining 180 thousand is for the cost of activities related to the marine environment. FY 1971-1974 marine environment costs are included with Section 3 costs.

There is a growing awareness of the natural resource values and the threat of pollution in the estuarine areas and waters of the Continental Shelf and other near-shore areas. The development, effective use, and management of these resources are being stimulated by agreements such as the 1964 Convention on the Continental Shelf, by interagency agreements, and by legislation such as the Marine Science and Engineering Development Act of 1966. The Convention, in effect, increases the land area of the United States by more than one million square miles, or over 25 percent. The Marine Science and Engineering Development Act established a positive oceanographic policy for the United States and called

upon the Federal establishment to develop a program which will accelerate the development and utilization of marine resources. These trends all have a major impact on activities carried out under the Federal Water Pollution Act, as amended, which includes the marine environment in its broad authority.

These efforts profoundly affect FWPCA's sphere of responsibility. The Agency must consider and be able to cope with problems of waste disposal into ocean areas; pollution problems associated with resource development off the Continental Shelf; and the disposal of wastes and sewage into shore areas. Solution of technical problems in the estuarine, marine, and oceanographic areas is requiring formulation and continued review of new policies, procedures, and techniques for dealing with those areas.

The FWPCA has taken the lead, especially in the estuarine environment, as authorized and directed in Section 5(g) of the Act, in conducting, in cooperation with other appropriate Federal, state, interstate, and local public bodies and private organizations, institutions, and individuals, a comprehensive study of the effects of pollution upon the aquatic environment of the Nation's estuaries. A report of this study is to be made to the Congress by November 1969. It will analyse the importance of estuaries to the economic and social well-being of the people of the United States and the effects of pollution upon estuaries, it will discuss major social and economic trends in the estuarine zones, and the report will recommend a comprehensive national program for the preservation, study, use, and development of estuaries.

Data and information for the study are being obtained through consultation with other interested Federal, state, and interstate agencies and national organizations; tabulation and examination of existing data; and contracts with universities, private industries, and other governmental organizations. About 30 public meetings have been held or scheduled in the coastal states and territories to give private citizens, local institutions, and organizations an opportunity to register their views on estuarine development and management.

In addition, FWPCA has developed a National Estuarine Inventory of the estuarine resources, their present uses, institutional controls, and interferences with beneficial uses due to pollution or other modifications such as dredging, filling or construction of highways or hurricane barriers. The National Estuarine Inventory involves: (a) a Handbook of Descriptors; (b) data gathering; (c) data automation; and (d) data utilization through computer programs. The Handbook contains the existing pertinent data on the Nation's approximate 850 estuarine areas. Unfortunately very little pertinent data has ever been compiled on a nationwide scale. Published reports and magnetic tape libraries are used to compile nationwide blocks of data.

The primary focus of the estuarine program is on the National Estuarine Pollution Study with its resulting recommendations for a management system and the final report. The recommendations are expected to lead to new legislation, as necessary, and new programs for protection of the estuaries. This cost report does not attempt to forecast these activities. However, certain activities initiated in connection with the National Study must be continued in any case.

The activities include continued maintenance, evaluation, and completion of data in the National Estuarine Inventory, as new data become available for use by and assistance to the "H.R.25" study group, as provided by P.L. 90-454, and other Federal and State agencies and private interests. These data will be updated as conditions change.

The Inventory will be incorporated into the FWPCA's established STORET system; into the National Oceanographic Data Center; and into other pertinent established data banks, in accordance with Section 5 of the Act. Estuarine data will be supplied to states and local organizations and will be made immediately available to other Federal agencies.

Pollution control activities in estuarine and open coastal waters must be intensified. Public and Congressional interests have focused substantially increased emphasis on the pollution problems of the marine environment, including the contiguous zones of the United States. Special efforts will be necessary to assure effective FWPCA participation in oceanographic activities relating to and affecting its mission. The breadth and depth of the undertaking will be mainly in identifying, analyzing, and interpreting pertinent oceanographic activities, establishing an adequate source data system, developing cogent information for up–the–line use and, based on the foregoing, developing guidance for public policies and acceptance of the increased responsibilities for water pollution control in the marine or oceanographic environment.

This will involve acceleration of many FWPCA activities currently conducted in estuarine and coastal waters under various provisions of the Act. In particular, special efforts will be called for under the comprehensive program authority of Section 3, to assure an approach which will provide long-range protection to the Nation's marine resources.

Completion of the National Estuarine Pollution Study will require $120,000 in FY 1970. Other costs budgeted for this item in FY 1970, as well as costs for the 5-year period for activities related to the marine environment, are included with other sections of the Act.

GRANTS FOR WATER POLLUTION CONTROL PROGRAMS

Section	Cost estimates (thousands of dollars) Fiscal Years					
	1970	1971	1972	1973	1974	Total 1970-1974
7 Grants	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 50,000
Administration	1/	530	530	530	530	2,120 2/

1/ Grants administration costs for FY 1970 are included with Section 3 costs.
2/ Four year total FY 1971-1974.

State agencies are the first line of defense in the national water pollution control effort. During the period 1970 through 1974 their responsibilities will increase as that effort gains momentum. Increased state capability will be needed to regulate waste discharges, to supervise construction and operation of waste treatment plants, to train plant operators, to monitor water quality, and to implement the lately established water quality standards.

Section 7 of the Federal Water Pollution Control Act authorizes grants to state and interstate agencies to assist in meeting the costs of establishing and maintaining adequate measures for preventing and controlling water pollution, including the training of personnel. Funds required for the grants per se and for administration for the next five years are presented above.

In 1963, a study by the Sentate Committee on Public Works, "A Study of Pollution – Water," (Staff Report to the Senate Committee on Public Works, 88th Congress, 1st Session, Committee Print), indicated that few states had adequate water pollution control programs. The need for state program improvement was further highlighted in a study, "Staffing and Budgetary Guidelines for State Water Pollution Control Agencies," done by the Public Administration Service for the Public Health Service in 1964. Despite recent strengthening and improvement by a number of states, many state programs are still considered inadequate, although program effectiveness is difficult to quantify. The above overall evaluation was based upon FWPCA's review of state program plans for FY's 1968 and 1969, which considered such factors as state agency authority, budget, staff (including salary levels), and treatment plant operator certification; establishment of intrastate water quality standards; water quality planning activity; and water quality monitoring. The kind and degree of improvement needed vary widely from state to state. During the next five years FWPCA will make every effort to assist in upgrading state programs.

Program grants are also awarded to interstate pollution control agencies. These interstate agencies, such as the Delaware River Basin Commission and the Ohio River Valley Water Sanitation Commission, will likely assume a more important role with a growing emphasis upon basinwide cleanup. In addition, basin planning grants under Section 3(c) of the Act, may lead to the establishment of new permanent interstate agencies which will become eligible for continued program support under the state and interstate program grants provisions under Section 7 of the Act.

This program started with a $3,000,000 annual authorization beginning in FY 1957, which was increased to $5,000,000 per year in FY 1962, and to $10,000,000 in 1968. By the end of FY 1968, $52,100,000 had been distributed to state and interstate agencies as shown in Table 2. This money has helped these agencies hire qualified people, develop laboratories and other facilities, and generally increase their pollution control efforts.

To assure the most effective utilization of these funds, after the increase of 1968, the FWPCA issued "Guidelines for Developing Program Plans for State and Interstate Agencies." These Guidelines set forth the essential elements of an effective program plan as a basis for receiving the Federal grant. For FY 1969 and beyond, the Guidelines and program materials have been modified to accomodate and guide both state and interstate agencies to plan, program, and budget their resources to meet water quality objectives in an orderly and timely fashion. Each agency applicant must now describe how it will carry out a broader, improved water pollution control program with the Federal grant.

The grant authorization expires in FY 1971. The present projected cost of carrying out this section of the Act assumes that the authorization will be extended beyond FY 1971, at its current level. However, it may prove desirable to extend this authorization at a substantial increase over the present level. In the next few years a number of pollution control efforts now underway are expected to be reaching a peak of activity. If major Federal construction grant (Section 8 of the Act) support is available, the state agencies will need to increase their staffs to supervise the expanding construction program.

State program grants can exert considerable influence on the total pollution control actions by non-Federal agencies to meet the new thrust in achieving effective state and local water quality management. The grant and administrative costs to the Federal government in this program could prove our best investment in achieving national objectives. Increased support may prove necessary in light of the anticipated increased costs in monitoring and surveillance, new plant operation and maintenance, and training of treatment plant operators to operate the more sophisticated equipment to assure full implementation of and compliance with the recently established water quality standards.

These combined factors will place heavy responsibilities on state and interstate agencies. Evaluation of state program effectiveness and needs and evolving state-Federal relationships in the national pollution control effort over the next several years should provide a basis for determining whether, and to what extent, Federal program grants should be increased.

Costs of administering this portion of the Act consist largely of providing personnel to work with the state agencies in developing more effective programs. Certain grant processing costs are also involved.

TABLE 2

FEDERAL GRANTS TO STATE AND INTERSTATE WATER POLLUTION CONTROL PROGRAMS AND STATE AND INTERSTATE EXPENDITURES

Fiscal Year	Federal Grants	State Agency Expenditures	Interstate Agency Expenditures	Total Grants and Expenditures
1957	$ 1,800,000	$ 4,004,501	$181,132	$ 5,985,633
1958	2,700,000	*	*	*
1959	2,700,000	6,514,980	370,628	9,585,608
1960	2,700,000	6,755,822	345,232	9,801,054
1961	2,700,000	7,606,088	717,801	11,023,889
1962	4,500,000	8,162,954	835,840	13,498,794
1963	5,000,000	9,277,135	636,021	14,913,156
1964	5,000,000	9,530,490	615,542	15,146,036
1965	5,000,000	11,204,986	681,778	16,886,764
1966	5,000,000	12,271,400	702,103	17,973,503
1967	5,000,000	17,642,924	506,333	23,149,257
1968	10,000,000	**	**	**

* Not available

** Data have not been received from all State and Interstate Agencies.

GRANTS FOR CONSTRUCTION OF TREATMENT WORKS
(SECTION 8)

Considerable progress was made in 1968 toward defining national water pollution control goals and waste treatment requirements, through the development of water quality standards and improved State program plans. Attainment of these goals will require continuing large capital expenditures for waste treatment facilities. Section 8 of the Federal Act authorizes grants to State, interstate, municipal and intermunicipal agencies for constructing the necessary facilities to prevent the discharge of untreated or inadequately treated sewage or other wastes into any waters.

In 1956 Congress recognized the need for a cooperative Federal-State-local effort under the stimulus of Federal leadership and funds. Since that time, the Federal Government has provided over 1.2 billion dollars as construction grants for sewage treatment plants. The resulting facilities now serve some 72 million people and contribute towards the improvement of 72,000 miles of rivers and streams.

The Congressional amendments of 1965 and 1966 provided for a vastly accelerated Federal effort and State and local governments responded accordingly. The previous chapter discussed expansions in the State water pollution control programs. One of the major purposes was to improve the States' capacity to encourage waste treatment construction where the needs are most acute. More and more of the States are establishing grant programs of their own to further stimulate local construction of waste treatment facilities and to take advantage of the larger Federal grants authorized, thus sharing the costs. Local planning groups are increasingly participating in reviewing proposed sewage treatment construction to ensure conformity with local and regional needs. Finally, the backlog of grant applications is an encouraging sign that more and more cities are now facing up to their responsibilities in controlling municipal pollution. As of December 1, 1968, 4,235 applications representing construction costing approximately $3.9 billion, were on hand or in preparation.

A good part of this heightened State and local effort has been premised on the expectation that Federal funding would go much higher than recent fiscal constraints allow. But as yet, the State and local commitment has not flagged. In fact, present construction levels have outpaced the proportionately available Federal grant funds. As of December 1, 1968, under the reimbursement program, 231 projects, costing $307 million, have been undertaken without any Federal aid, and 278 projects costing $805 million were undertaken with partial grant assistance amounting to $52 million. This represents 12.5% of the $414 million in grant funds which the 278 projects could have received. Twenty-three states, D.C. and three territories have passed legislation authorizing matching grant programs. All but seven of these states and one territory also provide state matching funds. In some states, e.g. New York, the difference between the Federal funds given and those to which the applicant community would be entitled to under the Act was made up, temporarily, by the state.

We have continued to work towards improving our definition of total needs, which was initiated with preparation of last year's "The Cost of Clean Water" report to the Congress. as a basis for developing and administering the Federal program. To control municipal waste discharges and to attain the water quality standards implementation plans, waste treatment facilities must be built where none exist, improved where they are obsolete, and enlarged as populations grow.

This year's "The Cost of Clean Water and Its Economic Impact" report to the Congress provides continuing insights concerning national needs and levels of investment required. Long held expectations that the investment requirements associated with municipal waste treatment works were being diminished do not seem likely to be borne out by events. As rapidly as treatment deficiencies are being reduced by the construction of new plants, new investment requirements are pressing forward to meet the pervasive need for replacement and upgrading of existing plants and to provide for the treatment of industrial wastes. In addition, it would appear that the investments in waste treatment involving lower costs have generally already been made; and, because of the need for larger plants, higher degree of waste treatment, further reaching interceptor sewers, and the rising costs of construction, the ones remaining impose increasingly greater marginal costs. These factors combined will result in pressing capital requirements upward significantly for many years.

Comparison of the investment levels proposed by the States in their State program plans and of those that are consistent with the national goal of achieving secondary waste treatment by 1973 for most all of the sewered population, suggests that unless the rate of capital investment is increased in keeping with the national goal, we cannot expect to be able to provide and maintain adequate treatment for the total sewered population by 1973.

In view of the need to greatly accelerate the construction program to meet the needs outlined above, a new and additional method of financing such construction during fiscal years 1970 and 1971 will be proposed. This method will be in addition to the direct grants method of financing and will not be a substitute for that method.

First priority in each State for additional assistance must be given to treatment works included in waste treatment systems servicing an area of fifty thousand people or more and contributiing to the development of a regional collection and treatment system.

Of ever increasing concern is the need to improve the return on investment in terms of clean water through more effective operation and maintenance. Performance audits have been made on grant projects. Although these have given only limited information on maintenance and operation levels, they have been sufficiently detailed to highlight the need for improvement in these vital areas.

This is an emerging problem which will require substantial efforts in order to define more fully the required operating levels and actual plant capabilities, and to undertake or stimulate the necessary training, the expert technical assistance, and the more effective supervision and certification of operators required to achieve optimum results. Acceleration of training efforts is described in the "Training" chapter of this report.

The proposed legislation provides for encouragement of inter-municipal systems and local financing.

Pending Congressional consideration of this far-reaching legislation, only the costs of administering the program requested in the President's Budget for FY 1970 and authorized by the Act for FY 1971 are presented, as follows:

COSTS (thousands of dollars)

	Grants	Contracts	Administration
FY 1970	$ 214,000		$3,050
FY 1971*	$1,250,000		

* Authorization ends in FY 1971 under the current provisions of the Act. The figure given here is amount authorized to be appropriated in that year and is not necessarily an estimate of true cost.

WATER POLLUTION CONTROL ADVISORY BOARD
(SECTION 9)

Section 9 establishes a Water Pollution Control Advisory Board consisting of the Secretary of the Interior, or his designee, as chairman, the Secretary of Health, Education, and Welfare, and nine representative public members appointed by the President.

The Board advises and consults with the Secretary of the Interior and makes recommendations to him on matters of policy arising under the Act. In general, the Board's goals are to provide the Secretary with useful supplementary information and points of view on water pollution control and to both shape and reflect public understanding of the problem.

Over the years, the Board has provided valuable advice to the Secretary on many important issues. It has also stimulated public awareness of the pollution problem and of the means for its control and has championed vigorous National, state, and local control programs.

Over the next five years the Board will continue to respond to the needs of the Secretary of the Interior. It is impossible, however, to detail a sequence of its activities covering the period.

The costs generated by this section of the Act are for a small secretariat at headquarters and for per diem and travel expenses of the Board when in session.

Costs for the Water Pollution Control Advisory Board for FY 1970-1974 are included in the total under Section 12.

WATER QUALITY STANDARDS COORDINATION

Section	Fiscal Years (in thousands of dollars)					
	1970	1971	1972	1973	1974	Total 1970-1974
10 (c)	$ 752	$ 762	$ 768	$ 773	$ 778	$ 3,833

As of January 13, 1969, standards from 45 states and four other jurisdictions had been wholly or partially approved by the Secretary of the Interior. It is anticipated that by the beginning of FY 1970, all standards will have received full Federal approval, including items requiring revision in the partial approvals. Federal action probably will be necessary to establish acceptable standards in two or three states which have failed to revise and modify their proposed standards to satisfy requirements of the Federal Water Pollution Control Act, as amended.

When standards are set, the Nation will have, for the first time, a body of specific goals and objectives for its waters and, in the implementation plans, realistic means for accomplishing those goals and objectives. Clearly this will be a landmark in water resource conservation.

The second phase of the standards program, generally characterized by refinement of criteria and implementation of waste treatment requirements, has been partially initiated and will be accelerated to the planned level of program effort in FY 1970. Although states have first responsibility, FWPCA will continuously review the extent to which implementation plans are executed. Extensive water quality monitoring by FWPCA, as well as State and certain of the other Federal agencies, will be important in the review process. Knowledge gaps discovered in the initial phase indicate a need for special studies to deal with various technical problems. Marine waste disposal, salinity, and temperature are examples. Also needed is research to improve our judgments concerning water quality requirements. Finally, the water quality standards will have to be revised and upgraded at such times in the future as technical knowledge improves and as waste disposal conditions and water use change.

Attaiment of the water quality set in the standards will constitute a principal program objective in the future. Accordingly, this will have a heavy impact on how all program resources are used. Grant programs, technical assistance, research and development, training, water quality monitoring, planning, and enforcement, activities all will be directed with the water quality standards goals foremost in mind. Thus, a good deal of the monies reported herein under other sections of the Act will be used in carrying out the general responsibilities

implied in Section 10(c). The costs projected above, therefore, are the relatively modest and stable sums needed for checking implementation progress, evaluating the standards, and coordinating various FWPCA activities in the interest of achieving the water quality standards goals.

It is expected that travel costs will significantly increase during the 1970-1974 period due to the need for more personal consultation with State personnel as the joint implementation program proceeds.

ENFORCEMENT

Section	Fiscal Years (thousands of dollars)					
	1970	1971	1972	1973	1974	Total 1970-1974
10 (d) (e) (f)	$ 3,700	$ 5,075	$ 5,075	$ 5,075	$ 5,075	$ 24,000

Note: Costs related to Uniform State laws and Interstate Cooperation are shown under Section 4.

Enforcement is a key element is the cooperative national water pollution control program. Federal enforcement assistance is made available to abate pollution of interstate or navigable waters which endanger the health or welfare of any persons. The enforcement authority is invoked either on State request or on Federal initiative on the basis of reports, surveys, or studies indicating that such pollution is occurring. Action is taken in the case of the intrastate pollution of interstate or navigabbe waters on the request of the Governor of the State.

The Water Quality Act of 1965 makes water quality standards established for interstate waters federally enforceable. The discharge into interstate waters of matter which reduces their quality below the established standards is subject to abatement through the exercise of enforcement authority. Enforcement and water quality standards are mutually supportive in providing for a specified set of conditions to adhere to and look for in enhancing and protecting water quality and in abating violations of such conditions.

Enforcement authority under Section 10 of the Federal Water Pollution Control Act has been invoked in forty-four abatement actions. The most recent conference involves pollution of the waters of Boston Harbor, Massachusetts.

To date, the enforcement actions have involved forty-one States and the District of Columbia, over 1,250 municipalities, more than 1,750 industries, about 100 Federal installations, and 75 or more State and private institutions. They have covered lake and coastal waters as well as over eleven thousand miles of streams. Twenty-eight actions have been instituted on Federal initiative, eleven at State request, and five on both basis. As water quality standards are implemented it is expected that FWPCA will be involved increasingly in these types of enforcement actions during Fiscal Years 1970-1974.

The "shellfish" enforcement authority conferred in the Water Quality Act of 1965 has been invoked in four instances. This authority is directed toward the abatement of pollution of interstate or navigable waters which is causing substantial economic injury because of inability to market shellfish products in interstate commerce. Shellfish resources in Maine, New York, New Jersey, and Massachusetts are the basis for these actions.

Cooperative Federal-State enforcement activity has had an important effect in attempting to solve complex, long-standing water pollution situations. To a remarkable degree, unanimous agreement on the required remedial programs and schedules has been achieved. This has been most recently demonstrated in the action initiated to clean up Lake Michigan. Representatives of the four Lake Michigan States of Illinois, Indiana, Michigan, and Wisconsin, and of the Department of the Interior responsibly considered and made detailed proposals for abating pollution from municipalities, industries, Federal activities, combined sewer overflows, agricultural practices, watercraft, natural runoff, and related activities throughout the basin, which were found to impair the use of the Lake's waters for municipal water supply, recreation, commercial fishery, fish and aquatic life propagation, and esthetic enjoyment. The water quality standards established for Lake Michigan and the action program resulting from the enforcement conference are complementary measures for saving Lake Michigan.

COOPERATION TO CONTROL POLLUTION FROM FEDERAL ACTIVITIES

Section	Cost estimates (thousands of dollars) Fiscal Years					
	1970	1971	1972	1973	1974	Total 1970-1974
11	$ 900	$ 1,250	$ 1,400	$ 1,400	$ 1,400	$ 6,350

The Federal Government must set an example by preventing, controlling, and abating pollution from its own activities and so provide leadership in the nationwide effort to improve water quality.

Section 11 of the Federal Water Pollution Control Act requires all Federal agencies to prevent and control pollution from properties under their respective jurisdictions by cooperating with the Department of the Interior, and with the States and interstate agencies and municipalities. Executive Order 11288, dated July 2, 1966, supplements this section by establishing general standards and delineating specific procedures and measures to facilitate each Federal agency's budgeting, planning, construction, and operations for such water pollution control.

FWPCA's responsibilities under the Water Pollution Control Act include: assisting Federal agencies to prevent, control, and abate water pollution from their proposed and existing facilities; reviewing proposed Federal water resources development projects to determine the impact of such development on water quality; encouraging Federal agencies to incorporate water pollution control requirements in all activities funded by Federal loans, grants, and contracts; and assisting the appropriate agencies in preventing pollution from Federal vessels. Through its program of review and technical assistance, FWPCA has helped develop pollution controls at Government military bases, hospitals, national parks and forests, post offices, and Federal water resource development projects.

Review of water pollution control measures at Federal facilities and buildings involves consultation in the development of treatment measures at new or modified installations; review of final plans for adequacy prior to construction, and inspection of existing treatment works. Assistance is given to Federal agencies in the design and construction of waste treatment and disposal facilities from the initial stages of planning to completion of the final plans and specifications, and in the development of effective waste treatment plant operation. In cooperation with the Federal agencies, on-site reviews of the waste disposal practices at existing installations are conducted for the purpose of advising as to the adequacy and effectiveness of water pollution control and waste treatment facilities, operating procedures, and laboratory analysis.

Information thus derived is used by agency planners to develop and update phased and orderly plans for installing improvements needed at installations under their jurisdiction for submission to the Bureau of the Budget. As a service to the Bureau of the Budget, FWPCA reviews these plans and recommends budget priorities for the projects proposed. FWPCA has reviewed the plans for 17 agencies and, based on priorities, recommended inclusion in the Federal budget of $51 million requested in FY '68 and $31 million in FY '69 to upgrade water pollution control at Federal installations.

Section 807 of the FY 1969 Military Construction Authorization Act requires the Secretary of Defense to consult with FWPCA on proposed water pollution control measures for military installations. Before funds can be expended for the construction of waste treatment or disposal systems authorized by this and all future Acts, FWPCA must advise the Department of Defense whether the degree and type of waste treatment and disposal proposed are consistent with applicable Federal and State water quality standards and whether the planned system is coordinated in timing with State, county, or municipal programs.

A system for recording and reporting data on waste disposal practices at Federal installations is being developed and the recorded information will be constantly updated. This system is designed to facilitate coordination and surveillance functions and preparation of status reports for the Congress, the Bureau of the Budget, and for FWPCA internal use.

A particularly significant means of exercising Federal leadership is found in Section 7 of the Executive Order, which encourages all Federal agencies to include water pollution control standards in their loans, grants and contracts. The Department of the Interior has notified its Bureaus and Agencies that they are expected to set an example in this government-wide effort and has directed them to submit for FWPCA review proposed regulations for water pollution control. Based on existing authority, FWPCA will work with agencies, encouraging and assisting them to (1) identify those Federal loan, grant, contract, leasing, licensing and permit programs which have an impact on the quality of the Nation's water resources; (2) develop water pollution control requirements applicable to each of these programs; and (3) develop procedures for implementation and enforcement of these requirements, including assistance in reviewing loan applications to ensure that the applicant's operation or activity will comply with water pollution control requirements.

In addition, legislation has been proposed which would expand the Federal Water Pollution Control Act to require Federal agencies to cooperate with the Secretary of the Interior to control water pollution by adding such conditions to contracts, licensees, leases, and permits as may be necessary to ensure compliance with water quality standards. This would include the regulation of heated wastewater discharges from conventional and thermo-nuclear power plants operating under Federal permits and licenses – a particularly pressing need.

Federal agency plans for dams, flood control, reclamation, and other water resource development projects must provide for protecting water quality. The interagency review procedures prescribed in Section 6 of Executive Order 11288 supplements the requirement of Section 3(b) of the Act that storage for streamflow regulation be considered in the planning of Federal reservoirs. As a result, FWPCA reviews plans for Federal water resource development projects and submits reports to the responsible agencies describing the potential impact of the projects on water quality, including, if necessary, recommendations concerning changes in design, construction, or operation for pollution control and water quality management.

Section 8 of the Executive Order authorized a study of pollution from the operation of watercraft, including Federally-owned vessels. This study was reported to the President. A broader report of similar nature required by Section 17 of the Act was submitted to the 90th Congress; and legislative action has been proposed on vessel pollution.

To facilitate interagency cooperation and provide a framework for coordination between the Federal agencies and State and local water pollution control organizations, FWPCA has issued "Guidelines for the Prevention, Control and Abatement of Water Pollution from Federal Activitites." In addition, separate agreements on coordination procedures have been reached with the Department of Defense, the Forest Service, the Bureau of Public Roads, and the Corps of Engineers.

All this is just the beginning of the continuing effort which must be strengthened to assure that the Federal establishment sets an example in pollution control. Additional staff is needed to meet the ever-growing demands for aid and to provide more effective and timely assistance to Federal agencies in carrying out their programs for controlling water pollution from their properties and activities. Such assistance is particularly essential in the design of water pollution control measures for new facilities, surveillance of waste treatment and disposal practices at existing installations, and the establishment of water pollution control regulations applicable to Federal loan, grant, and contract practices.

Current program plans call for control of pollution from all existing Federal installation within four years, assuming that additional staff is provided to carry out this program and that needed funds for treatment works at Federal facilities are authorized and appropriated. Experience to date indicates a need for more aggressive implementation of Section 7 of the Executive Order and the advisability of developing additional guidelines. This, too, will increase FWPCA's workload.

The cost estimates set out above assume that FWPCA's activities under Section 11 and Executive Order 11288 will be broadened as indicated. The costs are related almost entirely to providing personnel to work with other agencies in reviewing their plans and regulations and providing technical assistance in developing and coordinating control measures. They do not, however, include the cost of implementing legislation controlling vessel pollution, in the event such legislation is enacted; the cost of providing technical assistance for specially complex problems; or the cost of reviewing the plans of Federal water resource projects and reporting on their potential impact on water quality. These functions are carried out by other organizational components and are considered as part of the costs of carrying out Sections 3(b) and 5(a) of the Act.

ADMINISTRATION

Section	Fiscal Years (thousands of dollars)					
	1970	1971	1972	1973	1974	Total 1970-1974
12	$ 5,217	$ 5,600	$ 5,900	$ 6,200	$ 6,500	$ 29,417

Section 12 of the Act, authorizes the Secretary of the Interior to prescribe regulations, to engage staff and to utilize funds to carry out the purposes of the Act. The costs estimated above include those for overall direction (Office of the Commissioner), regional directors, program coordination, public information, and administrative services such as financial, personnel, facilities management, office services, procurement, and automation management.

The objective here is to provide overall leadership, direction, coordination, and administrative management support both at headquarters and in regional offices to facilitate attainment of Federal Water Pollution Control program missions. This involves the establishment of policies, procedures, plans, regulations and directives as needed; expansion and strengthening of the quantification of agency output objectives to make possible more incisive and far-reaching program analysis, reviews and decisions; guidance, coordination and direction; and providing administrative services to program activities, where applicable.

The Office of Program Coordination provides the Commissioner and his senior staff with an overview of agency operations through work planning and continuous examination of agency policies, and serves as a focal point for inter-agency liaison.

The Office of Public Information serves the public's right to know what FWPCA is doing and, through the dissemination of information, attempts to secure public cooperation in the total water pollution control effort.

COST STUDIES

Section	Fiscal Years (in thousands of dollars)					
	1970	1971	1972	1973	1974	Total 1970-1974
16 (a) 1/	$ 430	$ 450	$ 490	$ 490	$ 490	$ 2,350

1/ Costs for the annual study of the cost of carrying out the Act (Water Pollution Control – The Federal Costs) are included primarily with Section 12 costs but are also partially dispersed throughout all programs of the Agency.

In addition to this report, Section 16(a) requires transmittal of two other annual reports to the Congress. One study is an assessment of the national requirements and cost of treating municipal, industrial, and other effluent to attain State water quality standards set under the Act. The second study is an analysis of the economic impact on affected units of government of the cost of installing treatment facilities. The initial studies were transmitted to the Congress in January 1968.

Continuation of the national requirements and cost estimate study will include two general types of activities. One will be the development and application of automatic, computerized procedures for inventorying the rapid development of national requirements and costs for a variety of internal uses as well as for the report to the Congress. The second type of activity will include a wide range of analyses aimed at revealing significant relationships between alternative methods and levels of expenditures for pollution control and their relative effectiveness in reducing water pollution of interstate and coastal waterways. Both types of information will be extremely useful to the Congress and to the FWPCA in evaluating and developing programs of the FWPCA.

The economic impact study will be expanded in scope and breadth of analyses of the effects of various levels of expenditures for water pollution control by State and local governments on their economies, the relation to bond markets and the construction industry and methods of financing State and local expenditures.